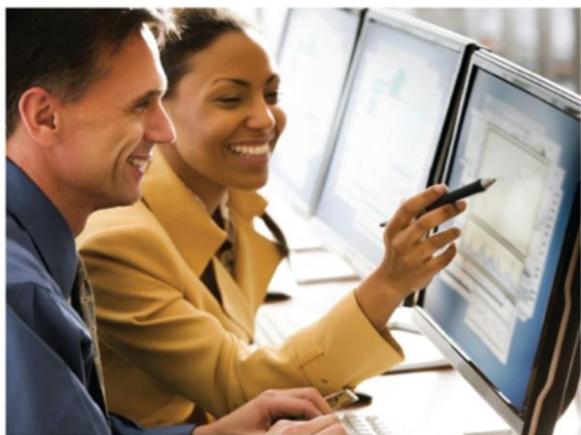# Exercises: Motion Estimation

AUVSI Foundation: Computer Vision Training

Hand Motion

Detect and visualize the motion of a hand in a video sequence.

1. Open the script `estMotionHand_start`. Here, a `VideoFileReader` object has already been created to read in the video file `thumb.avi` in grayscale. Fill in code according to the comments in the starter code. The following points help in implementing the rest of the code.

2. Create an `opticalFlow` object using one of the methods as shown below:
   - `opticalFlowHS` (Horn-Schunk)
   - `opticalFlowLK` (Lucas-Kanade)
   - `opticalFlowLKDoG` (Lucas-Kanade Derivative of Gaussian)

3. Implement a loop to process all video frames
   a. Acquire current frame.
   b. Estimate the motion using `estimateFlow`.
   c. Visualize the flow field using `plot`.

4. Try the Horn-Schunk and Lucas-Kanade methods. Observe the effect of
   a. Modifying name-value arguments of the optical flow object.
   b. Modifying name-value arguments of the visualization such as `ScaleFactor` when using the `plot` command.

Solution

```
>> estMotionHand
```

Motion Estimation of a Ball

Detect and visualize the motion of a ball moving to the right in a video sequence.

1. Open the script `estMotionBall_start`. Here, a `VideoFileReader` object has already been created to read in the video file `multiobject.avi` in grayscale. . Fill in code according to the comments in the starter code. The following points help in implementing the rest of the code.

2. Create an `opticalFlow` object using one of the methods as shown below:
   - `opticalFlowHS` (Horn-Schunk)
   - `opticalFlowFarneback` (Farneback)
   - `opticalFlowLK` (Lucas-Kanade)
   - `opticalFlowLKDoG` (Lucas-Kanade Derivative of Gaussian)

3. Implement a loop to process all video frames
   a. Acquire current frame.
   b. Estimate the motion using `estimateFlow`.
   c. Visualize the flow field using `plot`.
   d. Find pixels moving to the right (Use the `Vx` field of the optical flow field)
   e. Visualize results using `imshow`.

4. Try all the motion estimation methods. Observe the effect of
   a. Modifying name-value arguments of the optical flow object.
   b. Modifying name-value arguments of the visualization such as `ScaleFactor` when using the `plot` command.
   c. Chosen methods and their corresponding computational time.

Optical Flow

Movement to the RIGHT side

Horizontal Motion